Tuberculosis

Definition: An infectious, inflammatory, communicable disease that most commonly attacks the lungs, although it may occur in almost any part of the body. The causative agent, the tubercle bacillus (*Mycobacterium tuberculosis*), is spread through airborne transmission. ICD-9 codes 010-018

Summary

In 1994, 264 cases of tuberculosis were diagnosed in Washington for a crude incidence rate of 4.9 cases per 100,000 population. This rate was slightly over half of the national rate of 9.4/100,000, with Washington ranking 29th in the United States in tuberculosis incidence. More than half of the 1994 tuberculosis cases in Washington were among foreign born migrants, immigrants, or refugees from countries with high rates of tuberculosis.

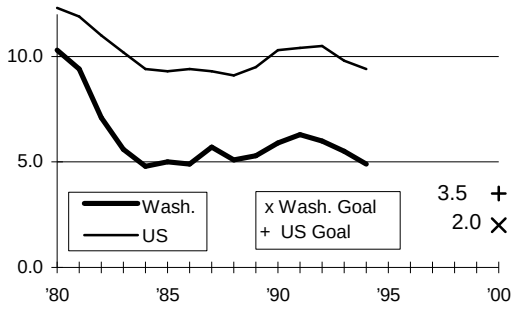
Time Trends

From the early 1940s until the mid-1980s, tuberculosis cases steadily decreased in Washington, paralleling the national trend. These declines were attributed to better living conditions, improved sanitation, and the introduction of effective chemotherapy. From 1984 until 1991, the number of tuberculosis cases increased by 49%, primarily because of increases in foreign born populations from areas of endemic tuberculosis, and to a lesser extent the HIV epidemic. Since 1992, Washington tuberculosis cases have again shown a downward trend of 7% per year.

Due to the characteristics and scope of the HIV epidemic in Washington, the impact of HIV on tuberculosis has been significantly less than in other parts of the country. From 1984 to 1991, the average percentage of tuberculosis cases with concurrent HIV infection was only 2.5%.

Tuberculosis

Reported Cases Per 100,000 Persons
with Year 2000 Goals



Year 2000 Goal

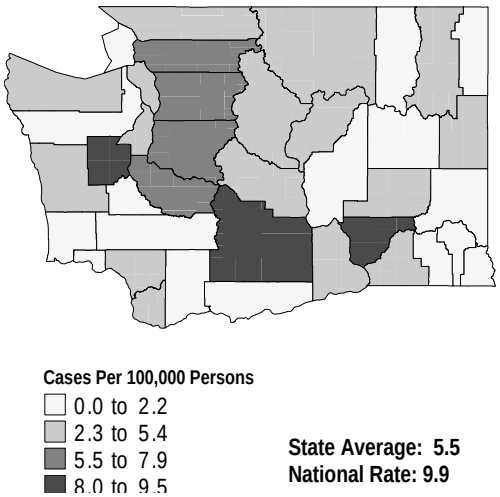
In Washington, the Year 2000 goal for tuberculosis incidence is 2.0/100,000. This is below the US goal of 3.5/100,000.

Although incomplete data suggest that the number of tuberculosis cases in 1995 may have increased slightly over 1994, the generally decreasing trends in the last few years make the goal of 2.0/100,000 possible *in the US-born population.* However, cases among foreign born persons immigrating to Washington from countries with much higher rates of tuberculosis, as well as among secondary migrants from states with large populations of foreign born persons, make achievement of this goal in the entire population less likely.

Geographic Variation

From 1992-1994, Washington's average annual tuberculosis incidence rate was 5.5/100,000. Rates by county varied from 0 to 9.6/100,000. Eleven counties had no cases during this period, 32 counties were below the average state rate, and seven counties (Yakima , Franklin,

Tuberculosis
Average Annual Incidence, 1992-1994



Mason, King, Skagit, Snohomish, and Pierce) were above the average state rate. No county was above the national incidence rate (9.9/100,000).

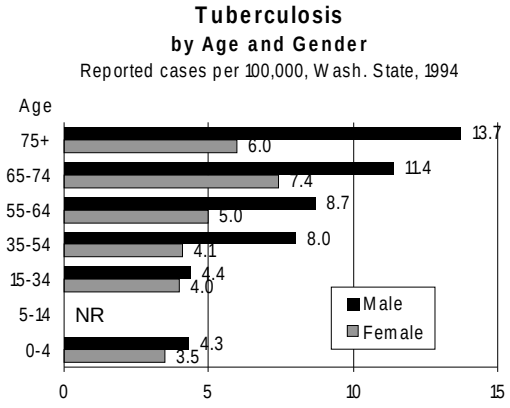
In 1994, 34 of Washington's 39 counties had 10 or fewer cases of tuberculosis. King County accounted for 116 (44%) of the 264 cases (incidence rate of 7.3/100,000).

Age and Gender

In 1994, age-specific tuberculosis rates in Washington were highest among persons over 64 years of age and persons 55-64 years of age.

Although the incidence of tuberculosis among US-born children under the age of 5 is relatively low, it has increased slightly over the last few years. This is of note since it indicates recent transmission of tuberculosis within the state and may reflect trends in the 15-34 year age group.

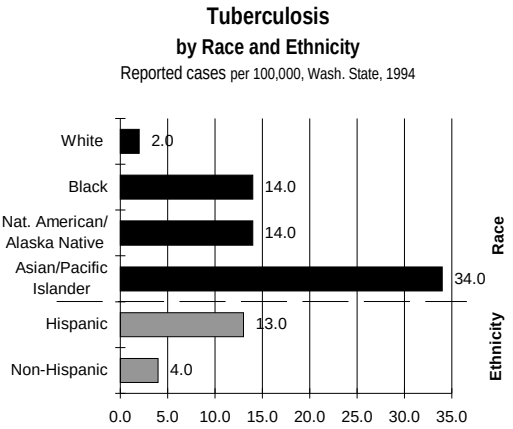
Males accounted for 60% of the tuberculosis cases in 1994; however, among foreign born cases, more women than men had the disease. The latter may reflect, to a large extent, the age and sex distribution of the foreign born population in Washington.



Race and Ethnicity

Nearly two thirds of the tuberculosis cases reported in Washington in 1994 occurred in racial and ethnic minorities. Compared with non-Hispanic whites, Asian/Pacific Islanders were 17 times more likely to have tuberculosis. Blacks, Hispanics and Native American/Alaskan Natives were seven times more likely. Increased rates in racial and ethnic minorities may result from a greater proportion of these persons having other risk factors for tuberculosis, such as living in a tuberculosis endemic country like Vietnam, Mexico, or the Philippines. Persons from these three countries accounted for 57% of tuberculosis cases among the foreign-born. Lower socioeconomic status is another possible risk factor that might contribute to higher tuberculosis rates among racial and ethnic minorities.

In 1994, 54% of all new tuberculosis cases reported in Washington occurred in foreign-born persons, many of whom were probably infected before arrival in the US. This compares to 31% of cases in the United States in 1994.



Other Measures of Impact and Burden

Drug Resistance. It is standard practice that all cultures of *M. tuberculosis* in Washington be tested for drug sensitivity. All local health jurisdictions, hospitals, and laboratories doing mycobacteriology send specimens for testing to the Washington State Department of Health Public Health Laboratories.

Drug susceptibility testing in 1994 revealed that of the 219 tuberculosis case specimens available for analysis, 15% were resistant to at least one antituberculosis drug. Only two persons had specimens that were multidrug resistant (i.e., resistant to both INH and Rifampin). Drug resistance was significantly higher in specimens collected from foreign-born persons than in US-born persons.

Risk and Protective Factors

Transmission. Tuberculosis is transmitted from person-to-person via the airborne route. When a person with pulmonary or laryngeal tuberculosis coughs or sneezes, droplet nuclei containing *M. tuberculosis* are expelled into the

air. These tiny particles (1-5 microns in diameter) can remain suspended in the air for several hours.[1] If another person inhales air containing these droplet nuclei, infection with tuberculosis may occur. Not all persons who are infected with tuberculosis develop tuberculosis disease.

Conditions that increase the risk of tuberculosis transmission. The probability that tuberculosis will be transmitted depends on three factors: the *infectiousness* of the person with tuberculosis, the *environment* in which exposure occurred, and the *duration* of exposure. Persons at highest risk of becoming infected are those who have close contact with and spend significant periods of time with persons with infectious tuberculosis. Although transmission rates cannot be calculated, infection rates among close contacts are relatively stable, ranging from 21% to 23%.[2]

Conditions that increase the risk of tuberculosis disease. Many conditions can increase the likelihood that tuberculosis infection will progress to disease. Among these are HIV infection; substance abuse (especially drug injection); recent infection with *M. tuberculosis*; chest radiograph findings suggestive of previous tuberculosis (in a person inadequately treated); diabetes mellitus; silicosis; low body weight; cancer of the head and neck; hematological and reticuloendothelial diseases; end-stage renal disease; intestinal bypass or gastrectomy; chronic malabsorption syndromes; prolonged corticosteriod therapy; other immunosuppressive therapy.

Preventive Therapy. Preventive therapy substantially reduces the risk that tuberculosis infection will progress to disease. Certain groups are at high risk of developing tuberculosis disease once infected. High priority candidates for preventive therapy are persons with a positive skin test in the following high-risk groups, regardless of age:

- Persons known to have or suspected of having HIV infection.
- Close contacts of a person with infectious tuberculosis.
- Persons who have an x-ray suggestive of previous tuberculosis and who have received inadequate treatment.
- Persons who inject drugs.
- Persons with the medical conditions that increase the risk of tuberculosis disease (see above).
- Recent tuberculin skin test converters.

High Risk Groups

The following persons are more likely to be exposed to or infected with *M. tuberculosis*:

- Close contacts of persons with infectious tuberculosis.
- Foreign-born persons from areas of the world where tuberculosis is common (e.g., Asia, Africa, and Latin America).
- Medically underserved, low-income populations, including high-risk racial and ethnic groups.
- The elderly.
- Residents of facilities such as prisons and nursing homes.
- Persons who inject drugs.
- Other groups identified locally as having an increased prevalence of tuberculosis (for example, migrant farm workers or homeless persons).
- Persons who may have occupational exposure to tuberculosis.

Intervention Points, Strategies and Effectiveness

The best way to stop transmission of tuberculosis is to isolate infectious patients immediately and start effective antituberculosis therapy. Infectiousness declines rapidly after adequate therapy is started, as long as the patient adheres to the prescribed regimen and is not infected with multi-drug resistant tuberculosis strains.

All new and suspected tuberculosis cases should be reported promptly to the health department by the clinician. Early reporting is essential for the timely evaluation of persons who have been in contact with the tuberculosis patient. Contact investigations are done by the health department, starting with the close contacts who are most likely to be infected, young children, and HIV-infected persons. These investigations allow identification of high risk individuals so that they may receive skin-tests, chest x-rays, and preventive or curative therapy, if appropriate.

Compliance. Nonadherence to therapy is a major problem in tuberculosis control. Nationally, about 25% of persons receiving treatment for tuberculosis disease do not complete a recommended regimen within 12 months.[3] In 1994, 12% of tuberculosis patients in Washington did not complete the recommended regimen within one year. Inadequate treatment can lead to relapse, continued transmission, and the development of drug resistance.

One way to ensure that patients adhere to therapy is to use directly observed therapy (DOT), in which a health care worker watches the patient swallow each dose of antituberculosis medication. DOT has been shown to be cost-effective and can lead to significant reductions in relapse and acquired drug resistance.[4] The only population-based prevention strategy which may lead to the elimination of tuberculosis are programs designed to put every tuberculosis patient on DOT in order to assure compliance with therapy.

Impact of the foreign-born. The federal Department of Health and Human Services' Advisory Committee for the Elimination of Tuberculosis continues to recommend that all foreign-born persons applying for permanent entry into the United States be screened for disease. However, deficiencies in current screening methods are present. Problems associated with current screening and follow-up requirements include:[5]

- People may enter the US with active tuberculosis that was missed during the required medical examination.
- Persons with tuberculosis may enter the US under a waiver but fail to comply with waiver provisions calling for further examinations and/or therapy.
- Some people arrive in the US with inadequately treated or drug-resistant tuberculosis.
- People in certain classifications may enter the US for extended periods without being required to have a medical evaluation for tuberculosis.
- People with tuberculosis may come to the US as visitors specifically to obtain treatment for tuberculosis.

As long as these screening deficiencies and the consequent absence of prophylactic treatment of infected persons continue, substantially higher tuberculosis rates can be expected in the foreign-born residents of Washington than among US-born residents.

Data Sources

State tuberculosis data: Washington State Department of Health

National tuberculosis data: Centers for Disease Control and Prevention.

For More Information

Washington State Department of Health, Tuberculosis Control Program, (360) 586-8344

Endnotes:

[1] Core Curriculum On Tuberculosis - What the Clinician Should Know, Third Edition, 1994. US Public Health Service, Centers for Disease Control and Prevention, Division of Tuberculosis Elimination, Atlanta, Georgia.

[2] Ibid.

[3] Ibid.

[4] Ibid.

[5] Tuberculosis Among Foreign-Born Persons Entering the United States. Recommendations of the Advisory Committee for Elimination of Tuberculosis. Morbidity and Mortality Weekly Reports, December 28, 1990/ Vol.39/ No. RR-18.